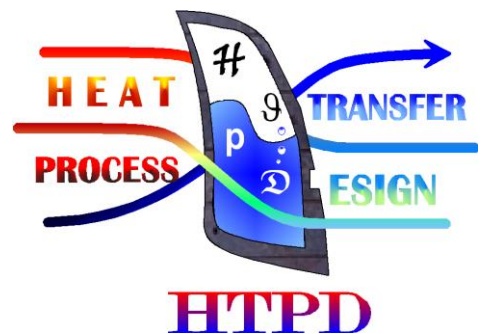


HEAT TRANSFER AND PROCESS DESIGN

HTPD





COMPANY

Heat Transfer and Process Design - HTPD was founded in 2008 as a "spin-off" company from the Institute of Energy and Process Engineering at the University of Paderborn.

As a young company with broad technical expertise, ambition and foresight, we support the industry with innovative concepts and reliable project management.

Depending on the size and needs of either an International or medium-sized company with a small team of experts, we can stand aside as an individual in solving your problems.

In international market developments, we respond quickly and flexibly well.

We support the industry in planning, design through to optimization and project management in the entire engineering process chain.

In addition, we also provide the scientific development, design and validation of innovative, problem oriented, energy saving solutions for automotive and chemical industries as well as general appliances and power plant manufacturers.

Our goal is the development and realization of new technologies in process engineering and plant construction. Our core competencies are planning, optimization and research in the field of heating, refrigeration, air conditioning, energy management and process engineering.

Consulting Engineering

MOTIVATION

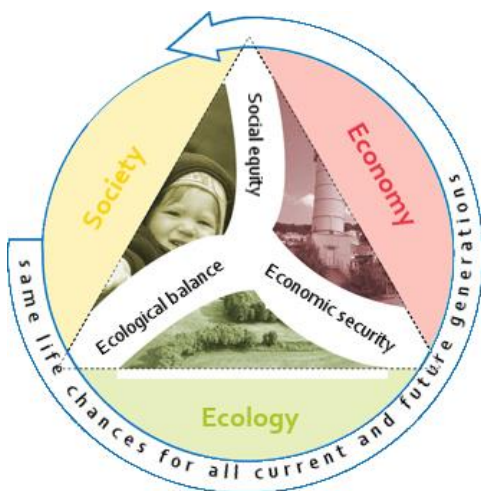
With over 20 years of consulting experience in various industries such as automotive, chemical and the general equipment technology, we have a broad overview of technologies and strategies to save energy and costs, in product design, management, process engineering and manufacturing of the products.

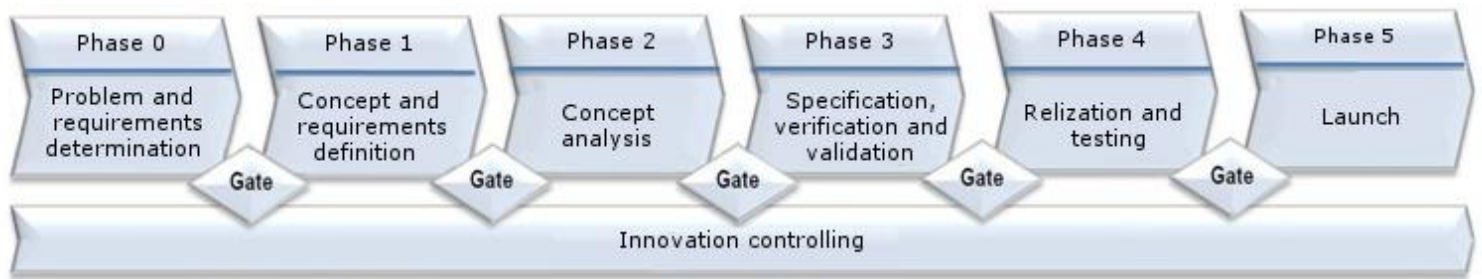
We are able to work out appropriate measures or solutions for our customers, who are striving for realization of energy-efficient and environmentally-friendly systems and products as well as industrial processes.



Future trends such as the Internet, renewable energies, additive manufacturing, intelligent networking, hybrid and electric cars have always been our business.

With all of our knowledge and expertise gained from practical experience, we will be pushing these issues with all our strengths to create synergies that will make the entire process more efficient. As a result, the environment is better protected for our next generation.





- | | | | | | |
|--|---|--|--|--|--|
| <ul style="list-style-type: none"> - Competitive intelligence - Scenario analysis - Weak signal - Stakeholder identification - Strategic plan - Problem definition | <ul style="list-style-type: none"> - Concept creation - Concept collection - Project vision - Stakeholder identification - Requirements analysis | <ul style="list-style-type: none"> - K.O. criteria - Value analysis - Business case - Rough analysis - Feasibility study - Economic efficiency - Functional and non functional requirements | <ul style="list-style-type: none"> - Specification sheet preparation - Rapid prototyping - Simultaneous engineering - Target costing - Marketing concept - Concept evaluation - Requirements verification, validation and agreement | <ul style="list-style-type: none"> - Product planning - Development - Supplier management - Production - Technical testing - Marketing strategy implementation | <ul style="list-style-type: none"> - Launch - Market penetration - Service - Maintenance |
|--|---|--|--|--|--|

BENEFITS

The HTPD team consists of technically enthusiastic experts with know-how and many years of experience from various sectors.

With our strong worldwide network, we can support your company in research, certification and marketing of your developed products.

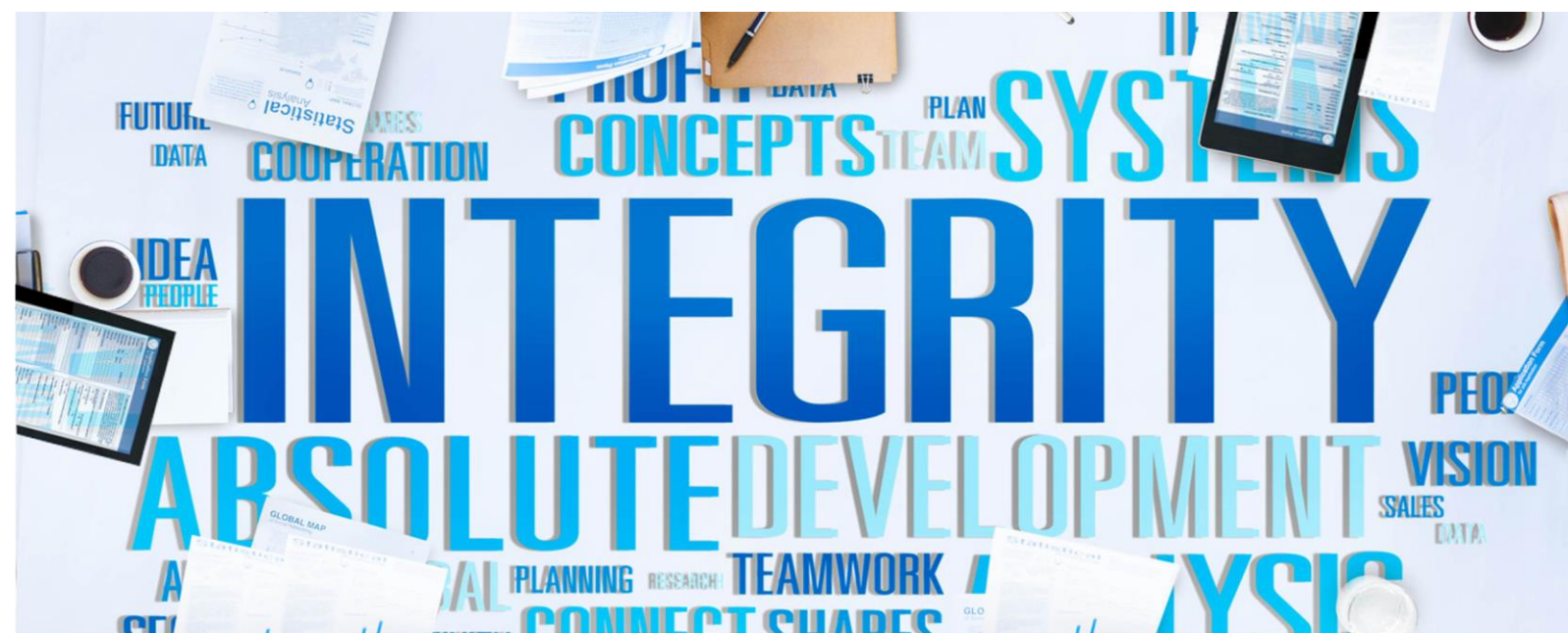
Innovative

HTPD is a company that is constantly researching new innovative approaches to solving problems. The prerequisite for innovative work is to always be technologically up-to-date.

For this reason, we maintain a close partnership with the University of Paderborn and the University of Applied Science Münster, which gives us access to laboratories, high-performance clusters and scientific literatures. This allows us to cost-effectively and efficiently realize new ideas from development, engineering through to marketing of the products.



We create more transparency and diversity, in order to make sustainable, innovative and flexible work easily achievable.

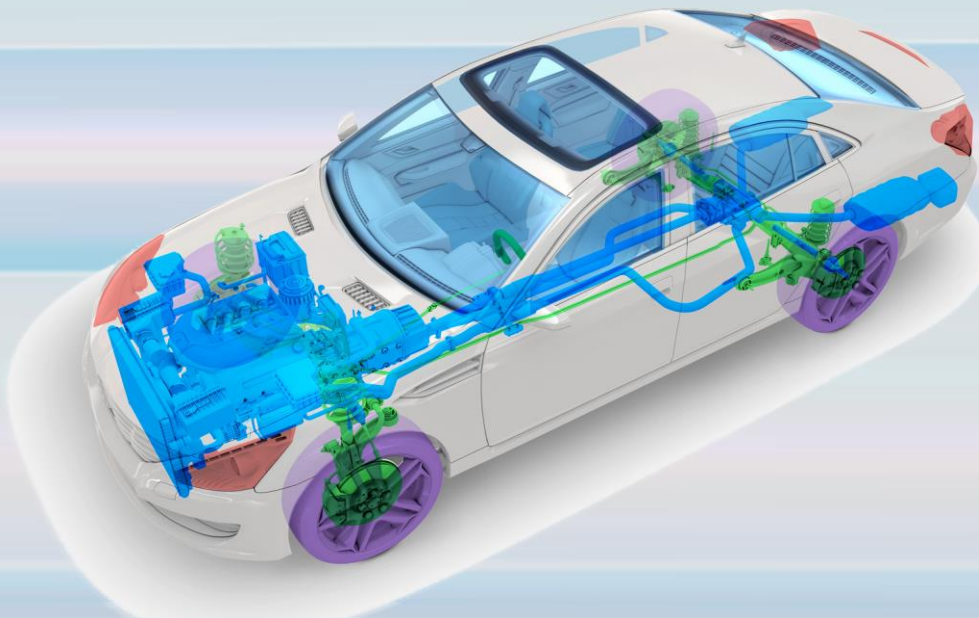


Flexible / Low coordination

The flat structure guarantees that every employee is involved in the company process by sharing its responsibilities. This leads to an increase in creativity, but does not have the disadvantage of emergence of a low productivity.

Low cost and time requirement

Engineering tools, such as modern simulation and management software, 3D printing technology and rapid prototyping, reduce the number of experiments, and also enable us to complete more long-term plans efficiently. This allows a shorter project realization time, which is nowadays basic. Furthermore, costs and effort are better calculated and reduced, which can directly be of great benefit to your company.



SERVICES

Our services can be divided into five major areas:

- **Interim project management**
- **Functional safety / quality**
- **Technology consulting**
- **Engineering / Product development**
- **Research & Development**

For your overview, we create performance specifications, target specifications, and project planning so that you will always have a view and control over the project.

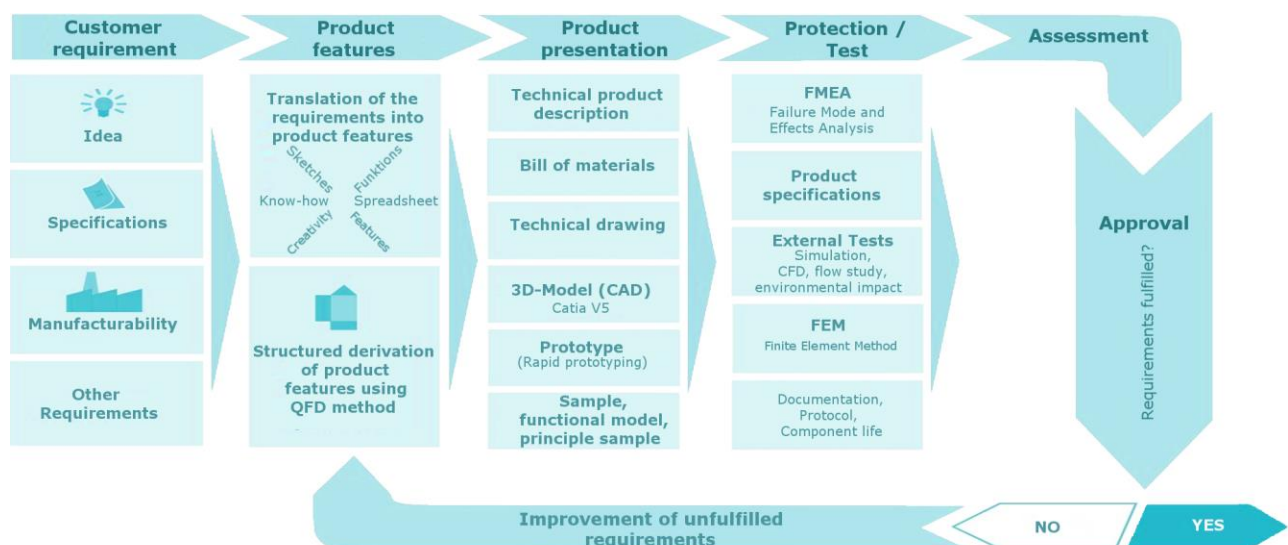
Functional safety / quality

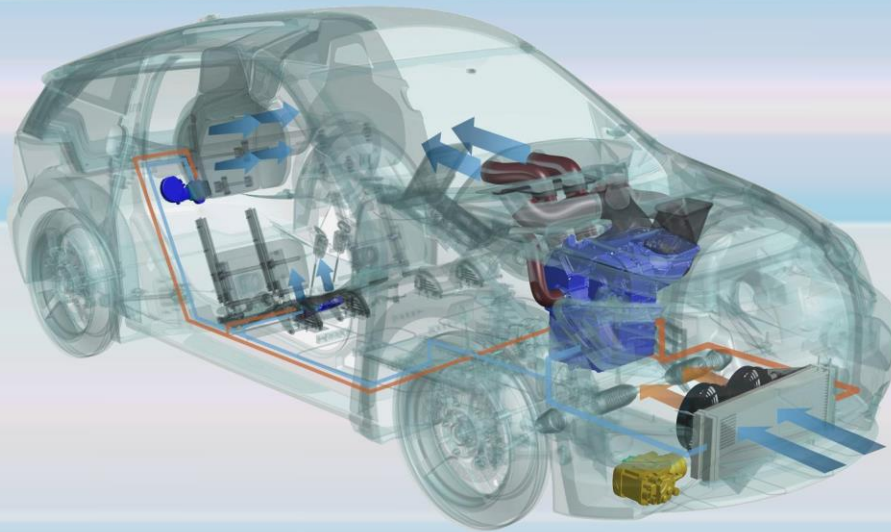
Based on FMEA moderation according to VDA & AIAG and the functional analysis, we ensure the quality and functional safety of your products.

Interim project management

HTPD supports you on the basis of experience and expertise. A project and goal are defined together, which reflects your full satisfaction.

Structural trees and fault networks help us to analyze errors and problems to find their solution.



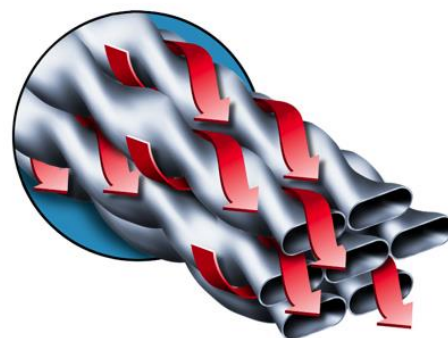


SERVICES

Technology consulting

HTPD offers the latest technology for product and process development. Based on our broad knowledge and experience from different industries, we are able to create highly sophisticated technical specifications and prototypes.

Furthermore, we are ideally suited for the development of ideas and innovative products. Our consultancy includes market and competition analysis as well as cost saving analysis for product and process development in order to achieve perfect products which stand the test of time.



Our services include:

- Description of overall process steps for the realization serial mass productions
- Cost saving analysis during product and process development
- Consulting for manufacturing strategies
- Consulting and preparation of applications for funding
- Consulting for product certification processes CE, CSA, UL, IECEx
- Pressure equipment line, ATEX
- Law, standards and regulations EU, ASME, CSA
- Consulting for measurement technology (software, hardware and sensors)
- Consulting for construction of test and pilot plants



SERVICES

Engineering

Nowadays, extensive and efficient engineering is essential for effective business management. HTPD supports you with the design, simulation and realization of your products.

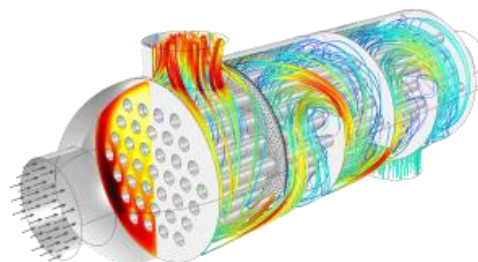
In addition, we also offer innovative and advanced solutions by means of rapid prototyping and additive production. So that you can produce relatively inexpensive prototypes in a timely manner and reduce the costs for quality assurance.

(Lean Engineering)

Based on our extensive knowledge of the industry and good global network as well as efficient engineering methods, we are able to develop qualitative engineering with profitable commercial solutions on a branch-specific basis. From this bundled know-how, a technology roadmap is created, which allows our customers to decide in advance whether, when and where the qualitative product or the plant should be manufactured at the best possible cost. **(Lean Production and Manufacturing)**

Research & Development:

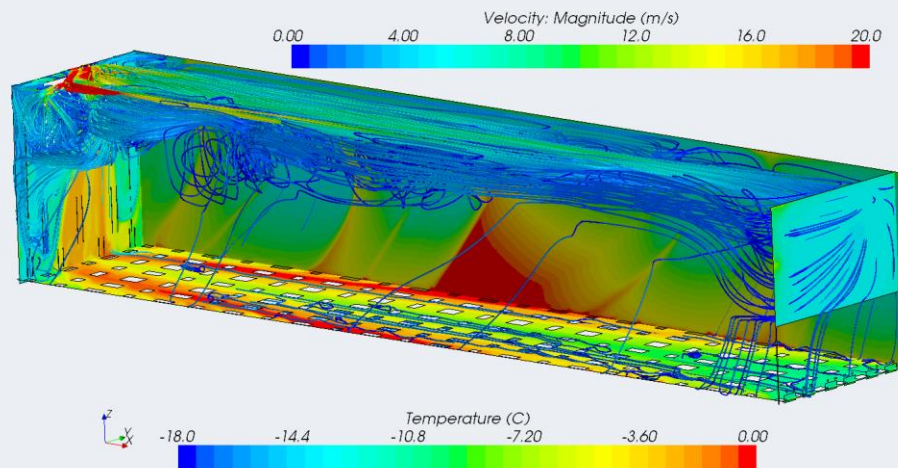
HTPD aims at working sustainably and efficiently, which is fundamental for new technologies. In cooperation with the University of Paderborn and the University of Applied Science Münster, HTPD is always working on a further development and realization of applied technology due to the steady advancement in technology.



This area can be divided into two areas; process determination / optimization, and product development.

Process determination and optimization are achieved using process concepts and flow diagrams. **Process simulations** can reduce the number of long, complex trial experiments.

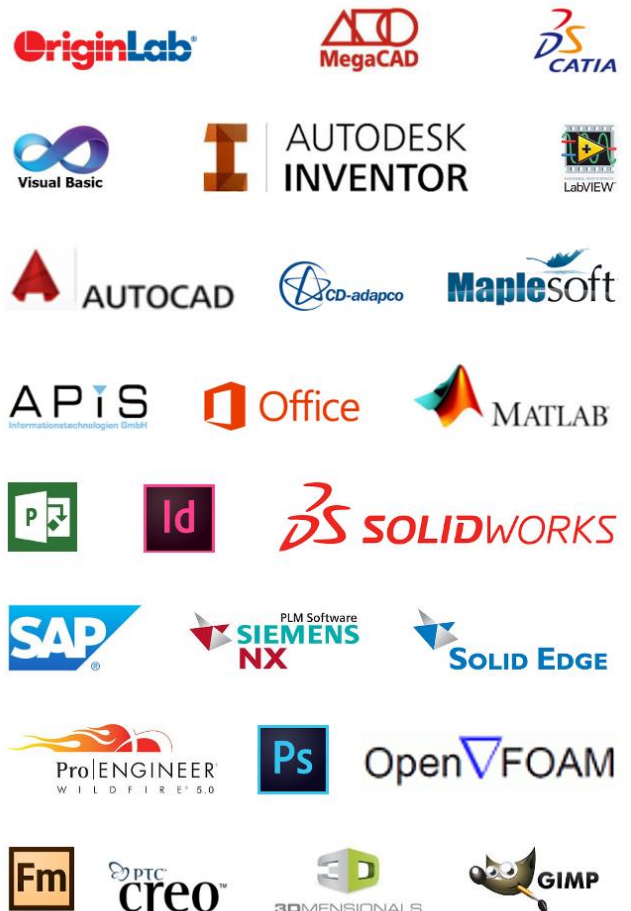
For optimum product development, synergies from CAD / CAE design, flow simulation CFD and structure analysis / FEM are executed.



HTPD-TOOLS

HTPD uses state-of-the-art engineering and project management tools in all areas to ensure efficient and up-to-date work.

- **Project management:** MS-Project, SAP
- **Design:** Inventor, Creo, Pro / Engineer, SolidWorks, Solid Edge, NX-Unigraphics, Teamcenter PDM / PLM
- **Prototyping:** 3D printer, Objet Eden260VS
- **Simulation:** Star CCM +, Matlab, NX-Thermal / Flow, OpenFOAM
- **Quality:** D- / P-FMEA, Apis IQ-RM
- **Technical editing:** GIMP, Photoshop, MS Office, InDesign, Framemaker





PROJECTS

Some of our completed projects in various sectors are listed below as a reference.

Automotive:

- Interim project manager and R&D for battery cooling systems (Valeo Klimasysteme GmbH)
- Development of a new measuring method for the separation efficiency of filters (Mann + Hummel GmbH)
- Development of an air-conditioning system for refrigeration vehicles (Schmitz Cargobull AG)
- Electrical engineering Interim project manager for Electronic headlight with Xenon, -ALWR, LED and AFS control units (Automotive Lighting GmbH)
- Development and production of innovative heating and cooling systems for LION battery for electric, hybrid cars (Gentherm Inc.)

Plant construction:

- Development of a model for the description of condensation processes on a corrugated 3D wall surface with Navier-Stokes equation (Uni Paderborn)
- Design of alternative gas-liquid mixing plants for filling Gas Insulated Switchgear -GIS (Ferchau Engineering GmbH & ABB Ltd.)
- Investigations and selection of an optimal process for the drying of cathode, anode and separator in the production of LION batteries for electric cars (Li-Tec Battery GmbH)
- Development of a physical model for the description of the cooling processes in ACC plant (SMS-DEMAG AG)
- Construction and commissioning of a condensation plant (Aif project, No. 13736N)

INDUSTRY 4.0

PROJECTS

Equipment technology:

- Construction and investigation of the Joule-Thomson refrigeration machine (Institute of Technology, University of Karlsruhe)
- Concept study of design and manufacture of highly efficient heat exchangers for domestic and equipment engineering (Miele & Cie. KG)
- Design of analytical instruments (ABB Automation GmbH)
- Development of refrigeration systems with environmentally friendly refrigerants (Rittal GmbH & Co. KG)

Building technology:

- Planning and construction of an energy saving house (Smart home) with LCN (Local Control Network)
- Design, product development for electric heating systems in Ex-zones (Bartec GmbH)
- Certification of electric heating systems (Bartec GmbH)

ABB

AL AUTOMOTIVE LIGHTING

BARTEC

epos Systemhaus

F FERCHAU ENGINEERING

GENTHERM

GULP

HARVEY NASH
The Power of Talent

KIT
Karlsruher Institut für Technologie

LAUDA

li-Tec
engineered power

MANN+HUMMEL

manz
passion for efficiency

Miele
IMMER BESSER

SALT AND PEPPER
committed to technological progress

SCHMITZ CARGOBULL
The Trailer Company

SMS DEMAC
SMS group

SOLCOM

THE LINDE GROUP

UNIVERSITÄT PADERBORN

Valeo

RITTAL

“We save the energy for tomorrow”

**Passionate, Inspirational,
Trustworthy, Reliable and
Responsive**

Heat Transfer and Process Design
Heisenbergstraße 17
D-33104 Paderborn
Tel. +49-5254-6402514
Fax. +49-5254-6402513
E-mail. info@htpd.de
Internet: www.htpd.de